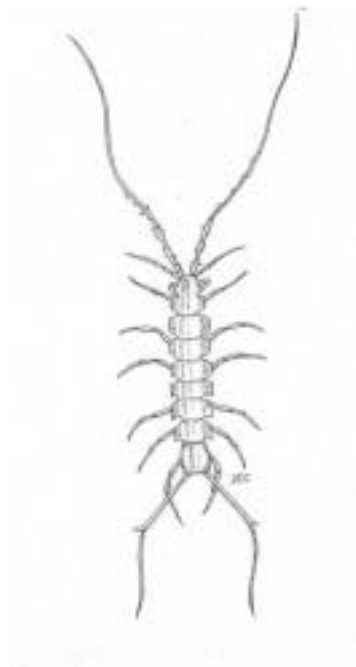


***Conservation Assessment  
for  
Holsinger's Cave Isopod (*Caecidotea holsingeri*)***



*(Franz and Slifer, 1971)*

***USDA Forest Service, Eastern Region***

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*This Conservation Assessment was prepared to compile the published and unpublished information on Caecidotea holsingeri. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject community and associated taxa, please contact the Eastern Region of the Forest Service Threatened and Endangered Species Program at 310 Wisconsin Avenue, Milwaukee, Wisconsin 53203.*

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## EXECUTIVE SUMMARY

Holsinger's cave isopod is designated as a Regional Forester Sensitive Species on the Monongahela National Forest in the Eastern Region of the Forest Service. The purpose of this document is to provide the background information necessary to prepare a Conservation Strategy, which will include management actions to conserve the species.

Holsinger's cave isopod is an obligate subterranean isopod crustacean. The species is relatively widespread, occurring primarily in eastern West Virginia, adjacent western Virginia and single locality in western Maryland.

## NOMENCLATURE AND TAXONOMY

<b>Classification:</b>	Class Crustacea Order Isopoda Family Asellidae Cannulus Group
<b>Scientific name:</b>	<u>Caecidotea holsingeri</u> (Steeves)
<b>Common name:</b>	Holsinger's cave isopod
<b>Synonyms:</b>	<u>Asellus holsingeri</u> <u>Conasellus holsingeri</u>

This isopod was described as Asellus holsingeri by Steeves (1963). The description was short and superficial, but sufficed for identification of the species. Lewis (1980) placed the species in the genus Caecidotea, following Bowman (1975) in recognizing the priority of the genus Caecidotea, rather than using Conasellus per Henry and Magniez (1970). Lewis (1980) redescribed the species and compared it with Caecidotea bowmani.

## DESCRIPTION OF SPECIES

Caecidotea holsingeri is an eyeless, unpigmented (white) isopod crustacean. Holsinger, et. al. (1976) report the maximum length to 12 millimeters. The male second pleopod endopodite tip is typical of species of the Cannulus Group in that it tapers to a single slender process. The species can be differentiated from Caecidotea cannulus by the presence of an obvious basal apophysis in Caecidotea holsingeri. Identification of this species requires laboratory dissection and examination of slide-mounted appendages under a compound microscope by a specialist in isopod taxonomy.

## LIFE HISTORY

Lewis (1980) reported ovigerous females in several collections examined. In material collected on 26 August 1978 in Bransford Cave (Greenbrier Co., West Virginia) at 3.2, 3.4 and 3.5mm in length. Fifteen of 19 females were ovigerous in a collection dated 29

August 1978 from Linwood Cave (Pocahontas Co., West Virginia) ranging in size from 5.5 – 7.9mm. A 3.5mm ovigerous female was present in a collection taken on 1 September 1978 in Martha's Cave (Pocahontas Co., West Virginia).

## HABITAT

This isopod is found in a variety of aquatic cave habitats, including stream gravels, under large rocks, on rotting wood in streams and drip pools (Holsinger, et. al., 1976).

## DISTRIBUTION AND ABUNDANCE

Caecidotea holsingeri is known from the extreme western part of Maryland through eastern West Virginia (Steeves, 1969) and five caves in three counties in western Virginia (Holsinger and Steeves, 1971; Holsinger and Culver, 1988; Holsinger, personal communication, 2001). Fleming (1972) and Holsinger, et. al. (1976) listed a total of 27 cave localities within this range, to which several new sites have now been added.

## RANGEWIDE STATUS

**Global Rank:** G3 vulnerable; The global rank of G3 typically includes species known from between 21-99 sites. Caecidotea holsingeri is the most common cave isopod in West Virginia (Holsinger, et. al., 1976; Lewis, 1980). With well over 20 localities reported in the literature and other sites remaining unpublished, this species would be ranked G3.

**West Virginia State Rank:** S3 vulnerable; Similarly, the state rank of S3 typically includes species known from between 21-99 sites within the state. Most of the reported collections of this species are from West Virginia.

## POPULATION BIOLOGY AND VIABILITY

Caecidotea holsingeri displays interesting relationships (presumably due to competition) with other cavernicolous isopod species in areas of overlap of their ranges. In the northern part of the range of Caecidotea holsingeri in Randolph County, West Virginia, where the range of the species overlaps that of Caecidotea cannulus, the size at maturity is only 3-6mm. In the rest of the range of Caecidotea holsingeri the size at maturity is typically 9-12mm (Lewis, 1980; Holsinger, et. al., 1976). Holsinger, et. al. (1976) reported that in Bowden Cave (Randolph County, West Virginia) Caecidotea holsingeri occurred syntopically with Caecidotea cannulus. This situation occurs in a small tributary stream in Bowden Cave and Caecidotea holsingeri outnumbers Caecidotea cannulus by a ratio of about 3 to 1.

In some caves Caecidotea holsingeri has been reported to have been excluded by the troglophilic isopod Caecidotea scrupulosa (Culver, 1973).

## POTENTIAL THREATS

Due to the presence of Caecidotea holsingeri in the restricted cave environment, it is susceptible to a wide variety of disturbances (Elliott, 1998). Caves are underground drainage conduits for surface runoff, bringing in significant quantities of nutrients for cave communities. Unfortunately, contaminants may be introduced with equal ease, with devastating effects on cave animals. Potential contaminants include (1) sewage or fecal contamination, including sewage plant effluent, septic field waste, campground outhouses, feedlots, grazing pastures or any other source of human or animal waste (Harvey and Skeleton; Quinlan and Rowe, 1977, 1978; Lewis, 1993; Panno, et al 1996, 1997, 1998); (2) pesticides or herbicides used for crops, livestock, trails, roads or other applications; fertilizers used for crops or lawns (Keith and Poulson, 1981; Panno, et al. 1998); (3) hazardous material introductions via accidental spills or deliberate dumping, including road salting (Quinlan and Rowe, 1977, 1978; Lewis, 1993, 1996).

Habitat alteration due to sedimentation is a pervasive threat potentially caused by logging, road or other construction, trail building, farming, or any other kind of development that disturbs groundcover. Sedimentation potentially changes cave habitat, blocks recharge sites, or alters flow volume and velocity. Keith (1988) reported that pesticides and other harmful compounds like PCB's can adhere to clay and silt particles and be transported via sedimentation.

Impoundments may detrimentally affect cave species. Flooding makes terrestrial habitats unusable and creates changes in stream flow that in turn causes siltation and drastic modification of gravel riffle and pool habitats. Stream back-flooding is also another potential source of introduction of contaminants to cave ecosystems (Duchon and Lisowski, 1980; Keith, 1988).

Smoke is another potential source of airborne particulate contamination and hazardous material introduction to the cave environment. Many caves have active air currents that serve to inhale surface air from one entrance and exhale it from another. Potential smoke sources include campfires built in cave entrances, prescribed burns or trash disposal. Concerning the latter, not only may hazardous chemicals be carried into the cave environment, but the residue serves as another source of groundwater contamination.

Numerous caves have been affected by quarry activities prior to acquisition. Roadcut construction for highways passing through national forest land is a similar blasting activity and has the potential to destroy or seriously modify cave ecosystems. Indirect effects of blasting include potential destabilization of passages, collapse and destruction of stream passages, changes in water table levels and sediment transport (Keith, 1988).

Oil, gas or water exploration and development may encounter cave passages and introduce drilling mud and fluids into cave passages and streams. Brine produced by wells is extremely toxic, containing high concentrations of dissolved heavy metals, halides or hydrogen sulfide. These substances can enter cave ecosystems through breach

of drilling pits, corrosion of inactive well casings, or during injection to increase production of adjacent wells (Quinlan and Rowe, 1978).

Cave ecosystems are unfortunately not immune to the introduction of exotic species. Out-competition of native cavernicoles by exotic facultative cavernicoles is becoming more common, with species such as the exotic milliped Oxidus gracilis affecting both terrestrial and aquatic habitats.

With the presence of humans in caves comes an increased risk of vandalism or littering of the habitat, disruption of habitat and trampling of fauna, introduction of microbial flora non-native to the cave or introduction of hazardous materials (e.g., spent carbide, batteries). The construction of roads or trails near cave entrances encourages entry.

## **SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION**

Part of the range of Caecidotea holsingeri extends into the Monongahela National Forest.

## **SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES**

No species specific management activities are being conducted concerning Caecidotea holsingeri.

The existing (1985) Monongahela Land and Resource Management Plan does not provide management direction for caves although they are being considered in the Forest Plan revision currently underway. A Forest Plan Amendment in progress for Threatened and Endangered Species will include management for the caves on the forest.

## **RESEARCH AND MONITORING**

No species specific research or monitoring activities are being conducted concerning Caecidotea holsingeri.

## **RECOMMENDATIONS**

Retain on list of Regional Forester Sensitive Species.

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